# UNDERWATER BRIDGE INSPECTION REPORT

# STRUCTURE NO. 2723

# CSAH NO. 153 (LOWRY AVENUE NORTH)

# OVER THE

# MISSISSIPPI RIVER

# **DISTRICT 5 - HENNEPIN COUNTY**



# PREPARED FOR THE

# MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 5221 (CEI 115)

# MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION

### **REPORT SUMMARY:**

The concrete of the substructure units inspected at Bridge No. 2723, Piers 1 through 4, was found to be overall in satisfactory condition with no defects of structural significance observed. The steel sheet piling below the waterline was in good condition with only light surface corrosion observed. The top of the pier footings within the steel sheeting was heavily deteriorated and the concrete pier shafts exhibited some vertical cracks extending from the top of the footing to the bottom of the stone masonry. The channel bottom appeared stable with no appreciable changes or significant scour since the previous inspection.

# INSPECTION FINDINGS:

- (A) Various gaps, which were up to 3 inches wide, were observed between the steel sheeting and the concrete footing at all of the piers.
- (B) The top of the concrete footings were heavily deteriorated within the steel sheeting with up to 1 foot penetration at all of the piers. However, the steel sheeting around each pier fully extended into the channel bottom with only light surface corrosion observed.
- (C) The middle portion of the concrete pier shafts exhibited various vertical cracks, 1/16 inch maximum in width, extending from top of the footing to the bottom of the stone masonry.
- (D) Timber debris was observed at the upstream nose of Pier 1, at the downstream nose of Pier 3, and scattered around the channel bottom around Pier 4 (some scattered steel debris also), and it mainly consisted of 1 to 2 diameter and smaller logs and branches

(E) The upstream portion of the fender system on Piers 2 and 3 exhibited areas of impact damage from the waterline up 4 feet. The timber and steel construction exhibited deterioration such as moderate corrosion, checking up to ½ inch wide, and some random minor loss of timber section.

# **RECOMMENDATIONS:**

- (A) Remove the accumulation of timber drift and debris around the upstream end of Pier 1.
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

### PROFESSIONAL ENGINEER

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Daniel G. Stromberg

Date 10/15/07 License #21491)

Respectfully submitted,

COLLINS ENGRYEERS, INC.

Daniel G. Stromberg

Registered Professional

Engineer, State of Minnesota

# MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION

# 1. <u>BRIDGE DATA</u>

Bridge Number: 2723

Feature Crossed: Mississippi River

Feature Carried: CSAH No. 153 (Lowry Avenue North)

Location: District 5 - Hennepin County

Bridge Description: The bridge superstructure consists of five steel through truss spans.

The superstructure is supported by two reinforced concrete abutments and four reinforced concrete piers. The piers are numbered 1 through 4, starting from the west end of the bridge. The bridge foundations consist of footings surrounded by steel sheeting and founded on piles.

### 2. <u>INSPECTION DATA</u>

Professional Engineer/Team Leader: Daniel G. Stromberg, P.E., S.E.

Dive Team: Clayton G. Brookins, Valerie Roustan

Date: October 4, 2007

Weather Conditions: Sunny, 65° F

Underwater Visibility: 0.5 Foot

Waterway Velocity: 0.5 f.p.s.

# 3. <u>SUBSTRUCTURE INSPECTION DATA</u>

Substructure Inspected: Piers 1 through 4.

General Shape: The piers consist of oblong rectangular concrete shafts, pointed at the upstream end and squared off at the downstream end. The shafts rest on footings encased within steel sheeting that follow the general shape of the pier shaft.

Maximum Water Depth at Substructure Inspected: Approximately 16.5 feet.

### 4. <u>WATERLINE DATUM</u>

Item 60:

Water Level Reference: Benchmark reference on Pier 4.

Water Surface: The waterline was approximately 2.6 feet below reference. Waterline Elevation = 798.5.

# 5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 61: Channel and Channel Protection: Code \_\_\_\_\_\_\_

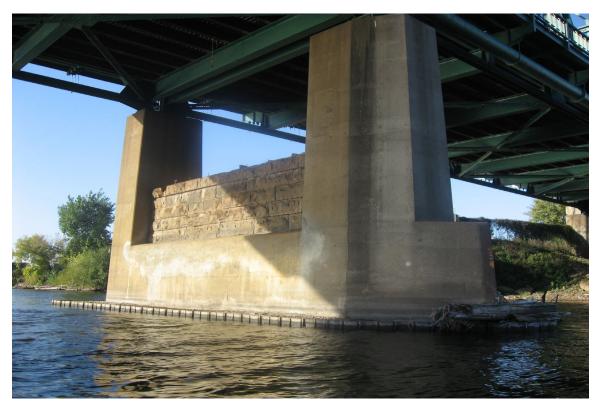
Item 92B: Underwater Inspection: Code <u>B/10/07</u>

Substructure: Code 6

Item 113: Scour Critical Bridges: Code <u>G/02</u>

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

\_\_\_\_\_Yes \_\_\_X\_\_No



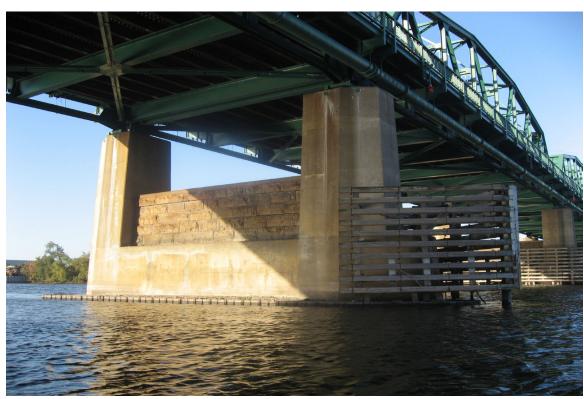
Photograph 1. View of Pier 1, Looking Southwest.



Photograph 2. View of Pier 2, Looking Southeast.



Photograph 3. View of Pier 2, Looking Southeast.



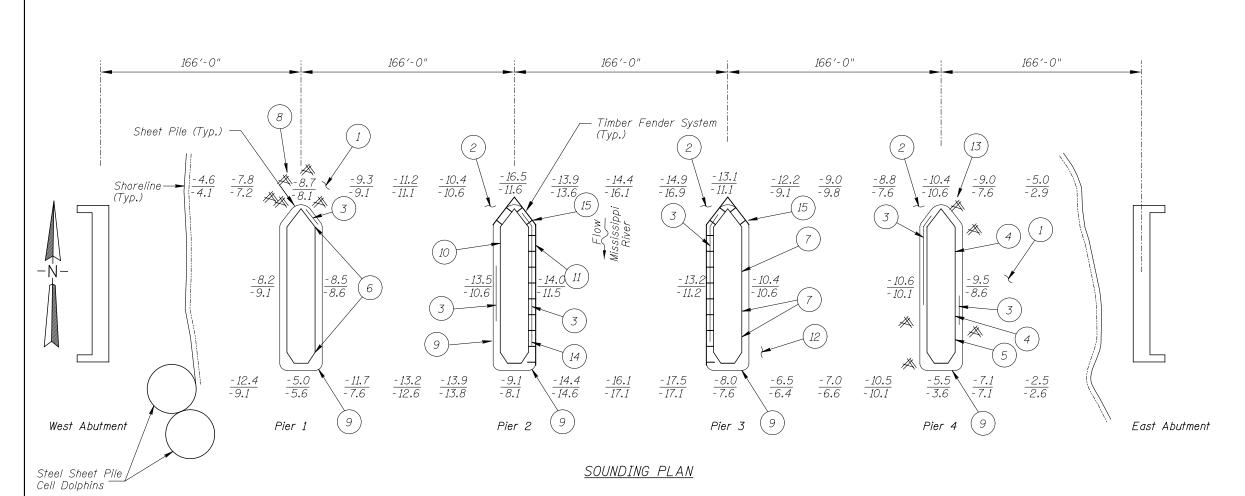
Photograph 4. View of Pier 3, Looking Southwest.



Photograph 5. View of Pier 3, Looking Southeast.



Photograph 6. View of Pier 4, Looking Southwest.



# B/Footing **≺**— Sheet Pile

TYPICAL END VIEW OF PIERS

# GENERAL NOTES:

- Piers 1 through 4 were inspected underwater.
- 2. At the time of inspection on October 3, 2007 the waterline was located approximately 2.6 feet below Benchmark Elevation 801.13 marked on Pier 3. This corresponds to a waterline elevation of 798,5,
- Soundings indicate the water depth at the time of inspection and are measured
- 4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.
- 5. Refer to Figure 1A for Inspection Notes.

Legend

Sounding Depth (10/3/07)

Sounding Depth (9/29/02)



Timber Debris



Inspection Note Number

Note

All soundings based on 2007 waterline location.

### **MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION**

STRUCTURE NO. 2723 OVER THE MISSISSIPPI RIVER DISTRICT 5, HENNEPIN COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: PRH Checked By: DGS Code: 52210115

COLLINS 123 North Wacker Drive Suite 300 Date: OCT. 2007

ENGINEERS 2 (37) 704-9300 Figure No.: 1

#### INSPECTION NOTES:

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(	1	The channel bottom material around Pier 1 consisted of silty sand and gravel with up to
		6 inches of probe rod penetration.

- The channel bottom material consisted of 1 to 2 foot diameter riprap at the upstream ends and sandy infilling with up to 1 foot of probe rod penetration.
- Several gaps were observed between the steel sheeting and the concrete footing up to 3 inches wide.
- The middle portion of the concrete pier shaft exhibited two vertical cracks that extended from the top of the footing to the bottom of the stone masonry. The cracks exhibited greas of section loss up to 3 inches wide with up to 1 inch of penetration.
- An 8 inch high band of heavy scaling was observed along the pier shaft at the top of the footing that extended approximately 30 feet and exhibited up to 2 inches of penetration and exposed reinforcing steel on the west side of Pier 4. There was up to 4 inches of penetration and exposed reinforcing steel on the east side of Pier 4.
- The middle portion of the concrete pier shaft exhibited five vertical cracks 1/16 inch wide (maximum) that extended from the top of the footing to the bottom of the stone masonry.
- The middle portion of the concrete pier shaft exhibited four vertical cracks 1/16 inch (maximum) that extended from the top of the footing to the bottom of the stone masonry.
- A moderate accumulation of timber debris consisting of logs and branches 1 to 2 feet in diameter and smaller was observed at the upstream nose on top of footing of Pier 1. The debris extended from the channel bottom up 3 feet and was 20 feet long.
- Typically, the top of concrete footing was heavily deteriorated within the steel sheeting with up to 1 foot penetration. The steel sheeting around each pier fully extended into the channel bottom with only light surface corrosion observed with 1/8 inch nodules.
- The middle portion of the concrete pier shaft exhibited five vertical cracks 1/16 inch (maximum) that extended from the top of the footing to the bottom of the stone masonry.
- An area of section loss was observed on the pier shaft 5 feet above the top of the footing and was 1 foot in diameter with up to 4 inches of penetration.
- A log that was 1 foot in diameter and 15 feet long was observed on the channel bottom along the downstream end of Pier 3.
- A light accumulation of timber and steel debris was observed scattered around Pier 4
- Four cracks were observed on the East side of Pier 2 extending from top of footing to the bottom of stone masonry 1/16 inch wide (maximum).
- The nose area of fender system has areas of impact damage from the waterline up 4 feet. Timber and steel show deterioration such as corrosion and checking up to 1/2 inch wide.

#### **MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION**

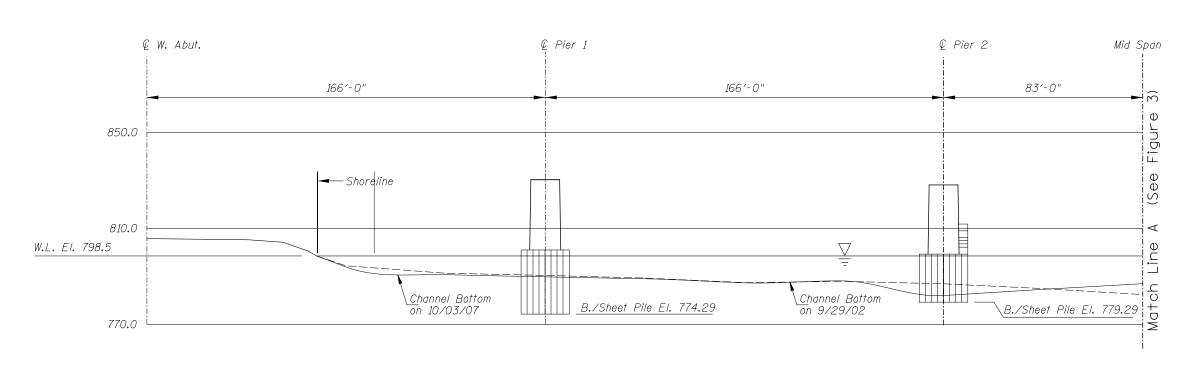
STRUCTURE NO. 2723 OVER THE MISSISSIPPIRIVER DISTRICT 5, HENNEPIN COUNTY

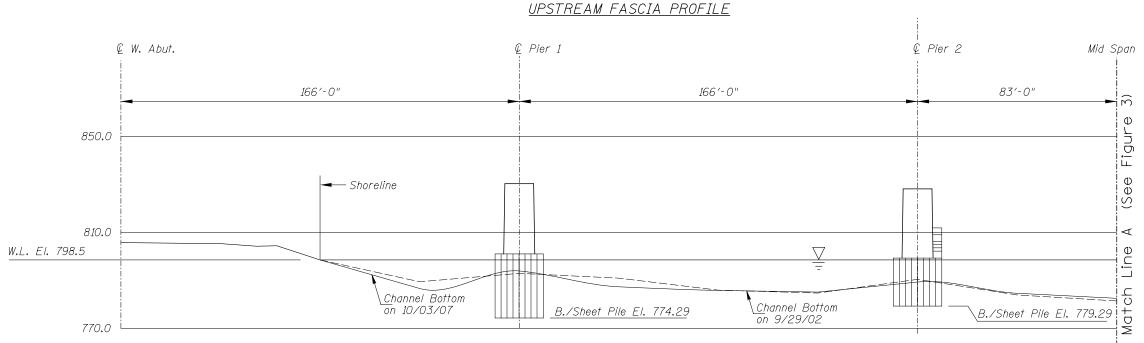
INSPECTION NOTES

Drawn By: PRH Checked By: DGS Code: 52210115

COLLINS Suite 300 Chicago, II. 60606 Chicago, II. 60606 Scale: N/A ENGINEERS 2 (312) 704-9300 www.collinsengr.com

Figure No.: 1A





# DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

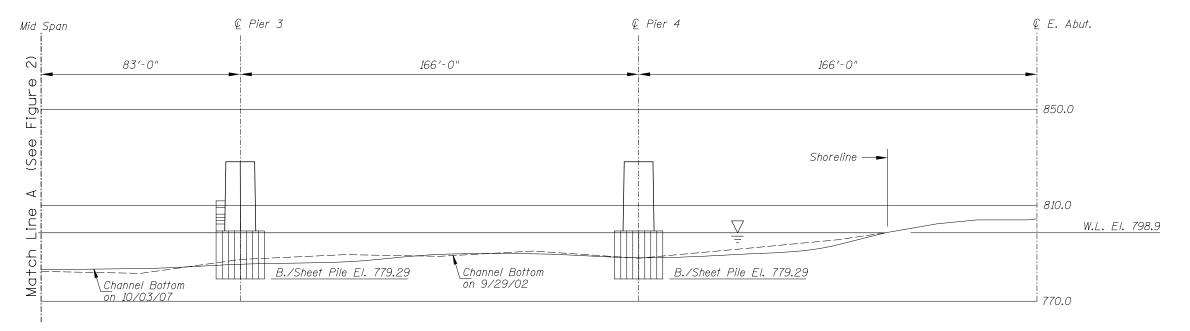
### MINNESOTA **DEPARTMENT OF TRANSPORTATION** UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 2723 OVER THE MISSISSIPPIRIVER DISTRICT 5, HENNEPIN COUNTY

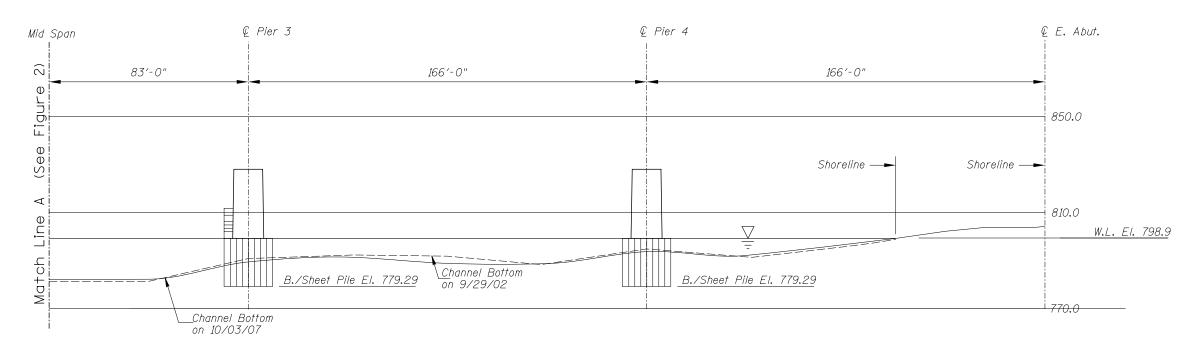
UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Checked By: DGS

Code: 52210115



# UPSTREAM FASCIA PROFILE



# DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

#### MINNESOTA **DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION**

STRUCTURE NO. 2723 OVER THE MISSISSIPPIRIVER DISTRICT 5, HENNEPIN COUNTY

UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: PRH Checked By: DGS Code: 52210115

-COLLINS 123 North Wacker Drive Suite 300
Chicago, II. 60606 Chicago, II. 60606 Scale: 1"=40"
ENGINEERS 2 North Wacker Drive Suite 300
Chicago, II. 60606 Scale: 1"=40"
Figure No.: 3

# MINNESOTA DEPARTMENT OF TRANSPORTATION OFFICE OF BRIDGES AND STRUCTURES DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: October 4, 2007
ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E., S.E.
BRIDGE NO: 2723 WEATHER: Sunny, 65°F
WATERWAY CROSSED: Mississippi River
DIVING OPERATION: X SCUBA SURFACE SUPPLIED AIR
OTHER
PERSONNEL: Clayton G. Brookins, Valerie Roustan
EQUIPMENT: Scuba, Boat, U/W Light, Scraper, Sounding Pole, Probe Rod, Camera,
Fathometer
TIME IN WATER: 8:40 a.m.
TIME OUT OF WATER: 9:10 p.m.
WATERWAY DATA: VELOCITY <u>0.5 f.p.s.</u>
VISIBILITY 0.5 foot
DEPTH 16.5 feet maximum at Pier 2
ELEMENTS INSPECTED: Piers 1 through 4
REMARKS: The submerged steel sheet piling was in good condition with only light surface
corrosion observed. However, the top surfaces of the concrete footings within the steel sheet
piling were heavily deteriorated with up to 1 foot penetrations. The concrete pier shafts
above the waterline were in satisfactory condition with some vertical cracks 1/16 inch
maximum width extending from the top of the footing to the bottom of the stone masonry. A
moderate accumulation of timber debris consisting of logs and branches 1 to 2 feet in
diameter was observed at the upstream nose of Pier 1. A 1 foot diameter by 15 foot long log
was observed on the channel bottom along the downstream end of Pier 3. A light
accumulation of timber and steel debris was observed scattered on the channel bottom
around Pier 4. The upstream portion of the fender system on Piers 2 and 3 exhibited some
areas of impact damage from the waterline up 4 feet.
FURTHER ACTION NEEDED: X YESNO
Remove the accumulation of timber drift and debris around the upstream end of Pier 1.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

# MINNESOTA DEPARTMENT OF TRANSPORTATION OFFICE OF BRIDGES AND STRUCTURES

### UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. <u>2723</u>	INSPECTION DATE October 4, 2007
INSPECTORS Collins Engineers, Inc.	NOTE: USE ALL APPLICABLE CONDITION
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.	DEFINITIONS AS DEFINED IN THE MINNESOTA
WATERWAY CROSSED Mississippi River	RECORDING AND CODING GUIDE INCLUDING
	GENERAL, SUBSTRUCTURE, CHANNEL AND
	PROTECTION. AND CULVERTS AND WALL

#### **CONDITION RATING**

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS (TOP)	DISPLACEMENT	ОТНЕК	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	ОТНЕК
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	8.7'	N	7	6	8	N	6	8	7	7	5	7	8	7	N	7	N	N
	Pier 2	16.5'	N	7	6	8	N	6	8	Ν	Ν	Ν	8	8	7	N	7	N	N
	Pier 3	13.2'	N	7	6	8	N	6	8	Ν	Ν	7	8	8	7	N	7	N	N
	Pier 4	10.6'	Ν	7	6	8	N	6	8	7	7	7	7	8	7	N	7	N	N

\*UNDERWATER PORTION ONLY

DEFINITIONS TO COMPLETE THIS FORM.

REMARKS: The submerged steel sheet piling was in good condition with only light surface corrosion observed. However, the top surfaces of the concrete footings within the steel sheet piling were heavily deteriorated with up to 1 foot penetrations. The concrete pier shafts above the waterline were in satisfactory condition with some vertical cracks 1/16 inch maximum width extending from the top of the footing to the bottom of the stone masonry. A moderate accumulation of timber debris consisting of logs and branches 1 to 2 feet in diameter was observed at the upstream nose of Pier 1. A 1 foot diameter by 15 foot long log was observed on the channel bottom along the downstream end of Pier 3. A light accumulation of timber and steel debris was observed scattered on the channel bottom around Pier 4. The upstream portion of the fender system on Piers 2 and 3 exhibited some areas of impact damage from the waterline up 4 feet.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO. USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.